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Canada Fisheries, Dept. of

STATISTICS  
OF THE  
HADDOCK FISHERY  
IN  
NORTH AMERICAN  
WATERS

By A. W. H. NEEDLER



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OTTAWA  
F. A. ACLAND  
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY  
1929

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STATISTICS

HADDOCK FISHERY

NORTH AMERICAN  
WATERS

BY WILLIAM A. HEDDERLEY



U.S. DEPARTMENT OF COMMERCE



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## Statistics of the Haddock Fishery in North American Waters<sup>1</sup>

The haddock fishery in the western North Atlantic is of considerable importance and its catches are increasing. In this report certain results of a consideration of the available statistics are presented.

Chiefly the statistics collected and published by the governments are considered here and we are concerned particularly with those giving directly or indirectly, the weights of the haddock catches made at various times and places. Two subjects, on which these data throw light, are discussed—(1) changes in the amounts of the catch from year to year and the question of depletion and (2) the geographical distribution of the haddock catch.

The haddock catches are all given in this report as weights of fresh haddock gutted but with the heads still on. This is the form in which the catches are most often purchased from the fishermen and is referred to as "fresh" in the United States statistics and as "Caught and landed (in a fresh or green state)" in the Canadian statistics. The whole weight is about 1.15 times the above weight in the summer, and larger in the winter.

### NORTH AMERICAN HADDOCK CATCHES SINCE 1880 AND THE QUESTION OF DEPLETION

The statistics of the total haddock catches since 1880 are given below. On account of the diversity of form those of each country are given separately.

NEWFOUNDLAND, FRANCE AND PORTUGAL.—The haddock catches by these countries in North American waters appear in their fishery statistics only very recently. Their small size (a combined catch of about two per cent of the North American total) makes their omission of little importance.

UNITED STATES.—The statistics of the United States haddock catches were taken from the annual reports of the Commissioner of Fisheries. They fall into two divisions—annual reports on the vessel fisheries of Boston and Gloucester since 1891, and complete surveys of the fisheries of the New England States in 1880, 1887, 1888, 1889, 1898, 1902, 1905, 1908, 1919, and 1924. For the latter years the amounts of the New England shore catch and of the vessel catch landed at other ports than Boston and Gloucester were determined. These were considered to have varied evenly between the known catches and the resulting estimated annual catches were added to those of Boston and Gloucester, giving a figure for the total New England catch each year since 1887. The Boston and Gloucester catches for 1890 and 1892 are averages of those for the adjacent years. During the years 1922 to 1927 there was a rapid increase in the haddock landings at New York and annual statistics of the landings in that city were furnished by Mr. J. H. Matthews of the Atlantic Coast Fisheries Company. As practically all the haddock of New York and New Jersey are landed at New York city these figures were taken as totals for those states. The catches of New York and New Jersey for earlier years were taken from surveys made in the years 1889, 1890, 1891, 1892, 1897, 1898, 1901, 1904, 1915, 1917, 1921, and 1926, and the annual catches were estimated by interpolation. The annual catches of the states of New York and New Jersey were then added to the New England catches to give the total United States catches. These appear in table 1.

<sup>1</sup> Contribution No. 2 from the North American Committee on Fishery Investigations.  
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Some of the catches were given in part as "salted" the fish under this heading being split and salted but not dried. The amount of salted fish was usually very small—about one per cent of the total. A factor of 2.0 was used to obtain the fresh weight of these catches. This factor is in current use in the compilation of statistics both in the United States and Canada.

TABLE 1—UNITED STATES HADDOCK CATCHES  
POUNDS OF FRESH GUTTED HADDOCK

| Year      | New<br>England<br>shore<br>catch | New<br>England,<br>Boston<br>and Glou-<br>cester | Vessel<br>catch<br>landed at<br>other<br>ports | Total<br>New<br>England<br>catch | Middle<br>Atlantic<br>States <sup>3</sup> | Landed at<br>New York<br>City <sup>4</sup> | Total<br>United<br>States<br>catch |
|-----------|----------------------------------|--|--|----------------------------------|---|--|------------------------------------|
| 1880..... |                                  |  |  | 42,800,000 <sup>(2)</sup>        |   |  | 42,800,000                         |
| 1887..... | 5,500,000                        | 24,100,000                                       | 11,200,000                                     | 40,800,000                       |   |  | 41,000,000                         |
| 1888..... | 5,500,000                        | 29,700,000                                       | 11,700,000                                     | 46,900,000                       |   |  | 47,100,000                         |
| 1889..... | 5,400,000                        | 29,100,000                                       | <sup>(3)</sup> 11,200,000                      | 45,800,000                       | 182,000                                   |  | 46,000,000                         |
| 1890..... |                                  |  |  |                                  | 174,000                                   |  | *50,200,000                        |
| 1891..... |                                  | 38,400,000                                       |  |                                  | 165,000                                   |  | *54,700,000                        |
| 1892..... |                                  |  |  |                                  | 176,000                                   |  | *52,200,000                        |
| 1893..... |                                  | 34,000,000                                       |  |                                  |   |  | *49,700,000                        |
| 1894..... |                                  | 45,600,000                                       |  |                                  |   |  | *61,000,000                        |
| 1895..... |                                  | 41,600,000                                       |  |                                  |   |  | *56,800,000                        |
| 1896..... |                                  | 30,200,000                                       |  |                                  |   |  | *45,200,000                        |
| 1897..... |                                  | 31,000,000                                       |  |                                  | 321,000                                   |  | *45,600,000                        |
| 1898..... | 6,300,000                        | 32,600,000                                       | 7,900,000                                      | 46,800,000                       | 413,000                                   |  | 47,200,000                         |
| 1899..... |                                  | 33,300,000                                       |  |                                  |   |  | *49,500,000                        |
| 1900..... |                                  | 33,100,000                                       |  |                                  |   |  | *45,900,000                        |
| 1901..... |                                  | 29,000,000                                       |  |                                  | 388,000                                   |  | *40,400,000                        |
| 1902..... | 4,300,000                        | 38,400,000                                       | 5,300,000                                      | 48,000,000                       |   |  | 48,400,000                         |
| 1903..... |                                  | 40,300,000                                       |  |                                  |   |  | *50,700,000                        |
| 1904..... |                                  | 48,600,000                                       |  |                                  | 448,000                                   |  | *59,500,000                        |
| 1905..... | 6,200,000                        | 66,700,000                                       | 4,700,000                                      | 77,600,000                       |   |  | 78,000,000                         |
| 1906..... |                                  | 61,600,000                                       |  |                                  |   |  | *73,300,000                        |
| 1907..... |                                  | 42,700,000                                       |  |                                  |   |  | *54,300,000                        |
| 1908..... | 7,300,000                        | 48,700,000                                       | 4,600,000                                      | 60,600,000                       |   |  | 60,900,000                         |
| 1909..... |                                  | 43,200,000                                       |  |                                  |   |  | *55,600,000                        |
| 1910..... |                                  | 49,900,000                                       |  |                                  |   |  | *62,500,000                        |
| 1911..... |                                  | 56,200,000                                       |  |                                  |   |  | *68,900,000                        |
| 1912..... |                                  | 63,500,000                                       |  |                                  |   |  | *76,300,000                        |
| 1913..... |                                  | 53,900,000                                       |  |                                  |   |  | *66,900,000                        |
| 1914..... |                                  | 57,900,000                                       |  |                                  |   |  | *71,000,000                        |
| 1915..... |                                  | 58,100,000                                       |  |                                  | 86,000                                    |  | *71,400,000                        |
| 1916..... |                                  | 55,300,000                                       |  |                                  |   |  | *68,700,000                        |
| 1917..... |                                  | 48,500,000                                       |  |                                  | 25,000                                    |  | *61,900,000                        |
| 1918..... |                                  | 60,700,000                                       |  |                                  |   |  | *74,300,000                        |
| 1919..... | 4,600,000                        | 75,900,000                                       | 9,200,000                                      | 89,700,000                       |   |  | 89,700,000                         |
| 1920..... |                                  | 73,400,000                                       |  |                                  |   |  | *88,500,000                        |
| 1921..... |                                  | 64,500,000                                       |  |                                  | 25,000                                    |  | *81,000,000                        |
| 1922..... |                                  | 65,600,000                                       |  |                                  |   | 4,300,000                                  | *87,600,000                        |
| 1923..... |                                  | 68,500,000                                       |  |                                  |   | 10,800,000                                 | *98,200,000                        |
| 1924..... | 8,700,000                        | 73,300,000                                       | 11,500,000                                     | 93,500,000                       |   | 14,400,000                                 | 107,900,000                        |
| 1925..... |                                  | 83,900,000                                       |  |                                  |   | 14,800,000                                 | *119,100,000                       |
| 1926..... |                                  | 88,000,000                                       |  |                                  | 17,020,000                                | 17,900,000                                 | *126,500,000                       |
| 1927..... |                                  | 121,200,000                                      |  |                                  |   | 30,400,000                                 | *174,200,000                       |

<sup>(1)</sup> Vessel catch in Essex and Suffolk Counties.

<sup>(2)</sup> "Estimated total when fresh" taken from "The Fisheries and Fishery Industries of the United States," C. B. Goode *et al.*

<sup>(3)</sup> New York and New Jersey—shore and vessel fisheries.

<sup>(4)</sup> Statistics furnished by the Atlantic Coast Fisheries Company.

\*Estimated as explained in text.

CANADA.—The Canadian haddock catches were obtained from the annual reports of the Department of Marine and Fisheries and from the Fisheries Statistics published by the Dominion Bureau of Statistics—the former from 1880 to 1917 and the latter since 1918. The statistics are based on annual, and, since 1911, monthly reports by the fishery overseers. These are compilations of the records of the various firms in their districts.



Before 1910 the statistics do not give the weights of the catch in terms of fresh gutted fish and this figure must be calculated from the weights of the products marketed. Since 1910 figures are published entitled "caught and landed in a fresh or green state." But uniformity throughout the period studied is desirable and the weights "caught and landed" are themselves at times calculated from the weights of the products marketed, e.g., in the case of the Lunenburg catches which are landed salted, and in those where fish are prepared by the fishermen themselves. For these reasons the Canadian catches given here are the weights of fresh fish, gutted but without the heads removed, calculated to be necessary to produce the amounts of the marketed products given in the statistics.

The opinions of eight representative fish firms were obtained in an effort to gain accurate knowledge of the quantitative conversion factors involved in the preparation of the various products from fresh fish. Certain tests were also made under the author's supervision. The results are given below.

**FINNAN HADDIE.**—150 to 180 pounds of fresh haddock (mean 167 pounds) were given as necessary to produce 100 pounds of smoked finnan haddie. Variations are due to differences in trimming and in the condition of the fish—fat fish lose less weight.

**DRIED HADDOCK.**—300 to 450 pounds of fresh haddock were given as necessary to produce one quintal (112 pounds) of dried haddock. Variations are due to the degree of salting and drying and the condition of the fish. In tests conducted by the author at Ingonish, C.B., in June, 425 and 450 pounds of fresh gutted haddock produced one quintal dried.

**FRESH FILLETS.**—250 to 360 pounds of fresh fish was considered necessary to produce 100 pounds of fresh fillets, depending largely on the method of cutting and trimming.

These figures show the lack of agreement on the quantitative factors involved. The following were regarded as the best available approximations to average conditions:—

*Finnan Haddie.*—167 pounds fresh to 100 pounds finnan haddie (smoked haddock).

*Dried.*—400 pounds fresh to one quintal (112 pounds) dried.

*Fillets.*—300 pounds fresh to 100 pounds salted.

*Canned.*—160 pounds fresh to one case canned.

The Canadian haddock catches calculated using these relations are given in table 2.

Doubt is cast on the accuracy of catches before 1888 when "hake and haddock" are given together in the detailed statistics, when the total for haddock is perhaps only an estimate and when certain discrepancies occur in the compilation of the provincial totals to make the Canadian totals. The extreme catch in 1897 is due entirely to one county—Digby—which showed an increase of 400 per cent in the catch with no increase in the fishing equipment. This record is considered doubtful in the 1897 report itself and we place no reliance on it here.

The "offshore" catch (defined in the Canadian statistics as that made on trips lasting more than two days), the inshore catch and the total are shown in table 3, all taken from the figures for haddock "caught and landed". The average prices per 100 pounds paid to the fishermen are also shown as they have a probable bearing on the post-war depression of the catch.

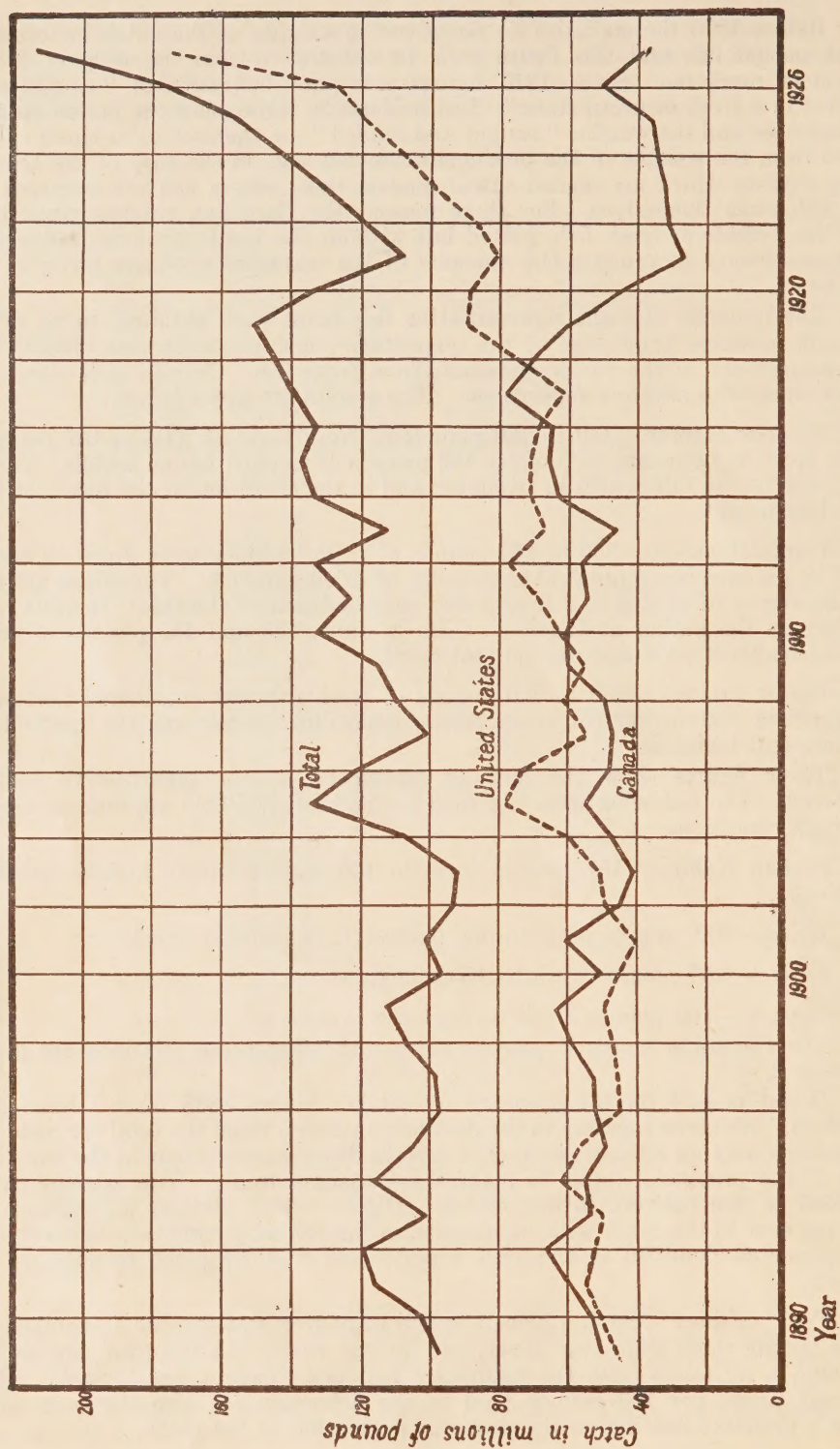


FIG. 1.—Catches of haddock in North America, given as the weight of fresh haddock, gutted but with the heads still on.



CHANGES IN THE HADDOCK CATCH.—The United States and Canadian haddock catches and the total catch for North America since 1889 are summarized in table 4 and figure 1. Disregarding the unreliable records before 1889 we can see no significant changes in the total haddock catch before 1903—only minor fluctuations with no general increase or decrease. From about that year to 1919 there is a distinct increase with fluctuations. A sudden depression followed, with a minimum catch in 1921, since which there has been a steady increase. To repeat—from a catch of about 100,000,000 pounds about 1900 the total increased with considerable fluctuations to about 150,000,000 pounds in 1919, decreased to 108,000,000 pounds in 1921 and reached 214,000,000 pounds in 1927.

TABLE 2—CANADIAN HADDOCK CATCHES

| Year      | Products marketed in pounds of fresh gutted haddock used |            |            |            |            | Total catch<br>in pounds of<br>fresh gutted<br>haddock |
|-----------|--|------------|------------|------------|------------|--|
|           | Fresh  | Smoked     | Dried      | Salted     | Others (2) |  |
| 1880..... |  |            | 43,600,000 |            |            | 43,600,000   |
| 1881..... |  |            | 47,100,000 |            |            | 47,100,000   |
| 1882..... |  |            | 71,500,000 |            |            | 71,500,000   |
| 1883..... |  |            | 69,200,000 |            |            | 69,200,000   |
| 1884..... |  |            | 86,800,000 |            |            | 86,800,000   |
| 1885..... |  |            | 74,400,000 |            |            | 74,400,000   |
| 1886..... |  |            | 85,400,000 |            |            | 85,400,000   |
| 1887..... |  |            | 86,400,000 |            |            | 86,400,000   |
| 1888..... |  |            | 94,900,000 |            |            | 94,900,000   |
| 1889..... |  |            | 50,300,000 |            |            | 50,300,000   |
| 1890..... |  |            | 53,200,000 |            |            | 53,200,000   |
| 1891..... |  |            | 60,000,000 |            |            | 60,000,000   |
| 1892..... |  |            | 67,000,000 |            |            | 67,000,000   |
| 1893..... |  |            | 53,300,000 |            |            | 53,300,000   |
| 1894..... |  |            | 54,900,000 |            |            | 54,900,000   |
| 1895..... |  | 400,000    | 48,300,000 |            |            | 48,700,000   |
| 1896..... |  | 1,900,000  | 50,100,000 |            |            | 52,000,000   |
| 1897..... | 3,500,000  | 2,900,000  | 89,900,000 |            |            | 96,000,000   |
| 1898..... | 5,700,000  | 3,800,000  | 49,700,000 |            |            | 59,200,000   |
| 1899..... | 4,400,000  | 4,100,000  | 54,200,000 |            |            | 62,700,000   |
| 1900..... | 5,300,000  | 3,300,000  | 41,600,000 |            |            | 50,200,000   |
| 1901..... | 4,700,000  | 3,500,000  | 52,300,000 |            |            | 60,500,000   |
| 1902..... | 4,400,000  | 3,500,000  | 37,300,000 |            |            | 45,200,000   |
| 1903..... | 8,100,000  | 3,300,000  | 30,000,000 |            |            | 41,400,000   |
| 1904..... | 7,300,000  | 4,400,000  | 35,200,000 |            |            | 46,900,000   |
| 1905..... | 11,500,000   | 4,500,000  | 39,900,000 |            |            | 55,900,000   |
| 1906..... | 10,500,000   | 4,500,000  | 33,100,000 |            |            | 48,100,000   |
| 1907..... | 12,600,000   | 4,400,000  | 30,000,000 |            |            | 47,000,000   |
| 1908..... | 8,600,000  | 5,500,000  | 34,900,000 |            |            | 49,000,000   |
| 1909..... | 11,000,000   | 4,300,000  | 44,700,000 |            |            | 60,000,000   |
| 1910..... | (1) 16,400,000   | 10,400,000 | 33,700,000 |            |            | 60,500,000   |
| 1911..... | (1) 24,600,000   | 12,900,000 | 17,300,000 |            |            | 54,800,000   |
| 1912..... | (1) 19,600,000   | 6,900,000  | 28,400,000 |            | 1,200,000  | 56,100,000   |
| 1913..... | (1) 14,600,000   | 4,600,000  | 25,600,000 |            | 1,100,000  | 45,900,000   |
| 1914..... | (1) 13,900,000   | 12,100,000 | 35,500,000 | 1,500,000  |            | 63,000,000   |
| 1915..... | (1) 15,400,000   | 8,200,000  | 35,800,000 | 4,100,000  | 2,300,000  | 65,800,000   |
| 1916..... | (1) 16,000,000   | 6,600,000  | 34,200,000 | 4,700,000  | 3,800,000  | 65,300,000   |
| 1917..... | 22,200,000   | 6,900,000  | 32,700,000 | 14,100,000 | 2,100,000  | 78,000,000   |
| 1918..... | 19,200,000   | 9,300,000  | 28,900,000 | 6,700,000  | 6,000,000  | 70,100,000   |
| 1919..... | 13,000,000   | 6,400,000  | 22,700,000 | 13,100,000 | 5,400,000  | 60,600,000   |
| 1920..... | 10,800,000   | 11,300,000 | 15,500,000 | 5,100,000  | 2,800,000  | 45,500,000   |
| 1921..... | 11,900,000   | 6,700,000  | 4,800,000  | 2,500,000  | 1,000,000  | 26,900,000   |
| 1922..... | 11,600,000   | 9,200,000  | 6,500,000  | 3,000,000  | 1,300,000  | 31,600,000   |
| 1923..... | 13,700,000   | 8,100,000  | 5,200,000  | 1,300,000  | 2,100,000  | 32,400,000   |
| 1924..... | 15,700,000   | 6,700,000  | 8,100,000  | 1,700,000  | 2,200,000  | 34,400,000   |
| 1925..... | 15,800,000   | 5,400,000  | 7,700,000  | 1,800,000  | 5,400,000  | 36,100,000   |
| 1926..... | 22,600,000   | 8,900,000  | 8,300,000  | 1,800,000  | 8,600,000  | 50,200,000   |
| 1927..... | 23,700,000   | 4,500,000  | 4,900,000  | 1,700,000  | 4,900,000  | 39,700,000   |

(1) Fiscal year. (2) In order of importance—smoked fillets, canned, and fresh fillets.

Considering the two countries separately we see that both the United States and Canadian catches show a general increase from 1903 to 1917. The United States catch, however, falls off only very slightly from 1919 to 1921, the post-

war depression of the total catch being largely due to a decrease in that of Canada from 78,000,000 pounds in 1917 (the largest recorded) to about 27,000,000 pounds in 1921 (the smallest recorded). Reference to table 3 shows that this depression of the catch was coincident with a fall in the prices paid to the fishermen. It was apparently due to economic factors at the close of the war rather than to any decrease in the abundance of the fish. "The marketing of fish and fish products was found to be difficult and prices fell to a figure which made it impossible, in some districts of the Atlantic coast especially, to carry on." (Report of the Deputy Minister of Marine and Fisheries, Canada, 1921.) This decrease was general, affecting both offshore and inshore fisheries and all parts of the coast. On the whole the recovery has been slow particularly in the shore fisheries.

TABLE 3—CANADIAN HADDOCK CATCHES

| Year          | Catches "caught and landed" (Pounds) |             |             | Price per cwt.<br>"Caught and<br>landed" |
|---------------|--------------------------------------|-------------|-------------|--|
|               | Offshore (1)                         | Inshore     | Total       |  |
| 1910 (2)..... |                                      |             | 45,700,000  | 1.45                                     |
| 1911 (2)..... |                                      |             | 53,000,000  | 1.40                                     |
| 1912 (2)..... |                                      |             | 50,400,000  | 1.65                                     |
| 1913 (2)..... |                                      |             | 40,600,000  | 1.90                                     |
| 1914 (2)..... |                                      |             | 56,600,000  | 1.60                                     |
| 1915 (2)..... |                                      |             | 58,300,000  | 1.35                                     |
| 1916 (2)..... |                                      |             | 58,200,000  | 2.05                                     |
| 1917.....     |                                      |             | 71,200,000  | 2.25                                     |
| 1918.....     | 25,200,000?                          | 30,200,000? | 55,400,000? | 3.35                                     |
| 1919.....     | 19,100,000                           | 37,300,000  | 56,400,000  | 2.40                                     |
| 1920.....     | 23,400,000                           | 20,800,000  | 44,200,000  | 2.00                                     |
| 1921.....     | 6,700,000                            | 20,200,000  | 26,900,000  | 1.75                                     |
| 1922.....     | 8,500,000                            | 22,200,000  | 30,700,000  | 1.75                                     |
| 1923.....     | 13,900,000                           | 16,600,000  | 30,500,000  | 1.65                                     |
| 1924.....     | 14,800,000                           | 19,000,000  | 33,800,000  | 1.80                                     |
| 1925.....     | 17,100,000                           | 17,300,000  | 34,400,000  | 1.90                                     |
| 1926.....     | 26,400,000                           | 23,200,000  | 49,600,000  | 1.80                                     |

(1) An "offshore" catch is made on a trip lasting more than two days.

(2) For 1910-1916 inclusive the catch is given for the fiscal year.

**INSHORE AND OFF-SHORE FISHING—Canada.**—The inshore and offshore catches are not given separately before 1918. They are shown since that date in table 3. It may be seen that they are similar in size at the beginning and end of the period 1918 to 1926 but that the offshore catch shows a greater depression and a quicker recovery during the period. The net result has been a relative gain for the offshore catches, which may be attributed largely to the otter trawl fishery.

**United States.**—In the United States the inshore catch is not as important as in Canada. Reference to table 1 shows that it has increased but that the increase in the United States total catch has been largely due to greater landings of the New England and New York vessel fisheries. This has been accompanied by the increased use of the otter trawl.

**THE OTTER TRAWL FISHERY.**—The increasing importance of the otter trawl fishery has been one of the most striking developments in the North American haddock fishery in the last twenty years. Otter trawls were first used in the United States for the haddock fishery in 1905 when one steam trawler was operated from Boston. They were introduced later in Canada and have taken an increasingly important part in the fishery in both countries. In 1926 eleven steam otter trawlers were fishing on the Canadian Atlantic coast and their catch was a large proportion of the Canadian offshore catch of haddock. Unfortunately records of the Canadian catches by otter trawlers have not been kept



TABLE 4—TOTAL HADDOCK CATCHES IN NORTH AMERICAN WATERS IN POUNDS OF FRESH GUTTED HADDOCK

| Year      | Canada         | United States | Total           |
|-----------|----------------|---------------|-----------------|
| 1880..... | (2) 43,600,000 | 42,800,000    | (2) 86,400,000  |
| 1881..... | (2) 47,100,000 |               |                 |
| 1882..... | (2) 71,500,000 |               |                 |
| 1883..... | (2) 69,200,000 |               |                 |
| 1884..... | (2) 86,800,000 |               |                 |
| 1885..... | (2) 74,400,000 |               |                 |
| 1886..... | (2) 85,400,000 |               |                 |
| 1887..... | (2) 86,400,000 | 41,000,000    | (2) 147,200,000 |
| 1888..... | (2) 94,900,000 | 47,100,000    | (2) 142,000,000 |
| 1889..... | 50,300,000     | 46,000,000    | 96,300,000      |
| 1890..... | 53,200,000     | 50,200,000    | 103,400,000     |
| 1891..... | 60,000,000     | 54,700,000    | 114,700,000     |
| 1892..... | 67,000,000     | 52,200,000    | 118,200,000     |
| 1893..... | 53,300,000     | 49,700,000    | 103,000,000     |
| 1894..... | 54,900,000     | 61,000,000    | 115,900,000     |
| 1895..... | 48,700,000     | 56,800,000    | 105,500,000     |
| 1896..... | 52,000,000     | 45,200,000    | 97,200,000      |
| 1897..... | (1) 52,400,000 | 45,600,000    | 98,000,000      |
| 1898..... | 59,200,000     | 47,200,000    | 106,400,000     |
| 1899..... | 62,700,000     | 49,500,000    | 112,200,000     |
| 1900..... | 50,200,000     | 45,900,000    | 96,100,000      |
| 1901..... | 60,500,000     | 40,400,000    | 100,900,000     |
| 1902..... | 45,200,000     | 48,400,000    | 93,600,000      |
| 1903..... | 41,400,000     | 50,700,000    | 92,100,000      |
| 1904..... | 46,900,000     | 59,500,000    | 106,400,000     |
| 1905..... | 55,900,000     | 78,000,000    | 133,700,000     |
| 1906..... | 48,100,000     | 73,300,000    | 121,400,000     |
| 1907..... | 47,000,000     | 54,300,000    | 101,300,000     |
| 1908..... | 49,000,000     | 60,900,000    | 109,900,000     |
| 1909..... | 60,000,000     | 55,600,000    | 115,600,000     |
| 1910..... | 60,500,000     | 62,500,000    | 133,000,000     |
| 1911..... | 54,800,000     | 68,900,000    | 123,700,000     |
| 1912..... | 56,100,000     | 76,300,000    | 132,400,000     |
| 1913..... | 45,900,000     | 66,900,000    | 112,800,000     |
| 1914..... | 63,000,000     | 71,000,000    | 134,000,000     |
| 1915..... | 65,800,000     | 71,400,000    | 137,200,000     |
| 1916..... | 65,300,000     | 68,700,000    | 133,800,000     |
| 1917..... | 78,000,000     | 61,900,000    | 139,900,000     |
| 1918..... | 70,100,000     | 74,300,000    | 144,400,000     |
| 1919..... | 60,600,000     | 89,700,000    | 150,300,000     |
| 1920..... | 45,500,000     | 88,500,000    | 134,000,000     |
| 1921..... | 26,900,000     | 81,000,000    | 107,900,000     |
| 1922..... | 31,600,000     | 87,600,000    | 119,200,000     |
| 1923..... | 32,400,000     | 98,200,000    | 130,600,000     |
| 1924..... | 34,400,000     | 107,900,000   | 142,300,000     |
| 1925..... | 36,100,000     | 119,100,000   | 155,200,000     |
| 1926..... | 50,200,000     | 126,500,000   | 176,700,000     |
| 1927..... | 39,700,000     | 174,200,000   | 213,900,000     |

(1) Estimated by replacing the extraordinary catch of Digby County, N.S., by the average for the two adjacent years.

(2) Canadian catches before 1888 unreliable. See text.

separate from those of the offshore line fishery. In the United States the otter trawl fishery has assumed larger proportions than in Canada. Most of the catches landed at New York city since 1922 have been made by otter trawlers. Statistics of the New England otter trawl fishery are given in table 5. The catches have been landed chiefly at Boston, and also at Portland and Gloucester. Haddock have consistently constituted over 80 per cent of the otter trawlers' catch and this may be considered principally a haddock fishery. Since the first otter trawler operated in 1905 the fleet has increased, reaching twelve in number by 1915 and averaging about thirty since 1920. Its haddock catch has, since 1920, been about one half of the total for New England.

Changes in the fishery are evident in table 5 both in the figures for the individual years and in the averages for the two periods for which statistics are available—1908-15 and 1920-27. Comparing these two periods we see that the catch per trip has increased over 50 per cent. The number of trips per

trawler has, however, decreased and the catch per trawler is lower for the later period and high again in 1927. Before 1915 the otter trawl fishery was confined largely to Georges bank and the South channel, while in recent years considerable catches have also been made on Nantucket shoals, Western banks and other grounds. The same changes in the fishery, however, are shown when only Georges bank and the South channel are considered.

The extent to which the above data indicate changes in the abundance of the fish is very doubtful. The increased catch per trip is rather an indication of a change in the nature of the trawlers enabling them to make longer trips. This is borne out by the decreased number of trips made by a trawler each year. The catch per trawler is probably the nearest approach to the catch per unit of fishing effort, which is our only criterion of the relative abundance of the fish. But we have just pointed out one change in the mode of operation and others are probable both in the fishing ability of the average trawler and in the average length of time spent in fishing each year. These changes influence the catch per trawler and make it unreliable as an indication of the abundance of the fish.

TABLE 5—NEW ENGLAND OTTER TRAWL FISHERY FOR HADDOCK

| Year             | Catch in pounds of fresh haddock | Catch as percentage of total | Number of trips | Catch per trip (pounds) | Number of trawlers | Number of trip per trawler | Catch per trawler (pounds)      |
|------------------|----------------------------------|------------------------------|-----------------|-------------------------|--------------------|----------------------------|---------------------------------|
| 1905.....        |                                  |                              |                 |                         | 1                  |                            |                                 |
| 1906.....        |                                  |                              |                 |                         | 1                  |                            |                                 |
| 1907.....        |                                  |                              |                 |                         | 1                  |                            |                                 |
| 1908.....        | 1,500,000                        | 3                            | 44              | 35,000                  | 1                  | 42                         | 1,500,000                       |
| 1909.....        | 1,700,000                        | 4                            | 47              | 36,800                  | 1                  | 47                         | 1,700,000                       |
| 1910.....        | 2,800,000                        | 5                            | 59              | 47,000                  | 1                  | 59                         | 2,800,000                       |
| 1911.....        | 7,400,000                        | 11                           | 178             | 41,400                  | 3                  | 59                         | 2,470,000                       |
| 1912.....        | 13,000,000                       | 18                           | 295             | 44,000                  | (2) 6              | 49                         | 2,170,000                       |
| 1913.....        | 12,500,000                       | 22                           | 326             | 38,200                  | (2) 9              | 36                         | 1,370,000                       |
| 1914.....        | 15,400,000                       | 23                           | 387             | 39,700                  | (1) 11             | 35                         | 1,400,000                       |
| 1915.....        | 17,100,000                       | 26                           | 380             | 45,000                  | 12                 | 32                         | 1,420,000                       |
| 1919.....        |                                  |                              |                 |                         | 27                 |                            |                                 |
| 1920.....        | 52,000,000                       | 65                           | 646             | 80,400                  | 44                 | 15                         | 1,180,000                       |
| 1921.....        | 26,700,000                       | 40                           | 346             | 72,300                  | 26                 | 13                         | 1,030,000                       |
| 1922.....        | 35,900,000                       | 51                           | 578             | 62,000                  | 28                 | 21                         | 1,710,000                       |
| 1923.....        | 35,500,000                       | 48                           | 665             | 53,400                  | 33                 | 20                         | 1,080,000                       |
| 1924.....        | 35,200,000                       | 44                           | 543             | 64,300                  | 32                 | 17                         | 1,100,000                       |
| 1925.....        | 44,000,000                       | 48                           | 607             | 72,500                  | 29                 | 21                         | 1,520,000                       |
| 1926.....        | 52,400,000                       | 60                           | 667             | 78,500                  | 30                 | 22                         | 1,750,000                       |
| 1927.....        | 69,200,000                       | 53                           | 794             | 87,200                  | 25                 | 32                         | 2,170,000                       |
| Average (3)..... | 8,900,000                        | 14                           | 215             | 40,900                  | 5.5                | 45                         | 1,840,000                       |
| 1908-15.....     |                                  |                              |                 |                         |                    | (4) 40                     | (1,620,000)<br>(5)              |
| Average (3)..... | 43,900,000                       | 51                           | 606             | 71,300                  | 31                 | 20.1<br>(4) 19.6           | 1,440,000<br>(1,420,000)<br>(5) |
| 1920-27.....     |                                  |                              |                 |                         |                    |                            |                                 |

(1) Including two from New York for part of the year.

(2) Including one from New York for part of the year.

(3) Averages of figures calculated for each year.

(4) Average number of trips divided by average number of trawlers.

(5) Average total catch divided by average number of trawlers.

CHANGES IN THE DISTRIBUTION OF THE CATCH OF THE BOSTON AND GLOUCESTER VESSELS FISHERIES.—In table 6 the geographical distribution of the Boston and Gloucester vessel fisheries is summarized for two periods—1891 to 1901 and 1916 to 1925, both inclusive. The grounds east and west of 66° west longitude are totalized separately.

Considering first only these large divisions we see that the catch from the nearer grounds doubled and that from the more distant more than doubled between the two periods. The latter increased from 8.9 to 11.8 per cent of the



total—a change hardly great enough to be regarded as showing a significant shift of the fishery further afield.

The catches on individual grounds changed greatly in relative size. Actual decreases occurred in the catches on La Have bank, Cape shore, Cashes bank, Jeffrey ledge, off Highland light and Middle bank. On all of these the line fishery preponderates. The two former are close to the coast of Nova Scotia just east of cape Sable: the rest are in the southwestern part of the gulf of Maine. On Georges bank, on which the line catches remained greater than the otter trawl catches, the catch increased but the percentage of the total catch decreased from 33 per cent to 24 per cent. The percentage of the total catch increased on Quereau bank, Brown's bank, Western bank, in the South channel, on Nantucket shoals and off Chatham. The haddock catches are made chiefly with otter trawls on all these grounds except Quereau and Brown's banks where they are made entirely with lines.

Thus greatly increased haddock catches were made in the later period on these grounds where the otter trawl fishery predominated. Of the grounds where there was no otter trawling the nearer showed greatly decreased catches and Brown's bank showed greatly increased catches while the total line catch east of 66 degrees remained about the same. Although the total haddock catch does not show a general decrease on the nearer grounds accompanied by increases further afield the line fishery by itself does so and the increases on the nearer grounds are due to the otter trawl fishery.

TABLE 6—GEOGRAPHICAL DISTRIBUTION OF THE HADDOCK CATCH OF THE BOSTON AND GLOUCESTER VESSELS FISHERIES

HADDOCK CATCHES IN POUNDS OF FRESH GUTTED HADDOCK

| Fishing Ground                 | Average for 1891 to 1901 |                           | Average for 1916 to 1925 |                           |
|--------------------------------|--------------------------|---------------------------|--------------------------|---------------------------|
|                                | Catch                    | Percentage of total catch | Catch                    | Percentage of total catch |
| La Have bank.....              | 2,049,000                | 5.9                       | 683,000                  | 1.0                       |
| Western bank.....              | 396,000                  | 1.1                       | 5,721,000                | 8.5                       |
| Quereau bank.....              | 24,000                   | 0.1                       | 713,000                  | 1.1                       |
| Cape Shore.....                | 601,000                  | 1.7                       | 597,000                  | 0.9                       |
| Other grounds E. of 66° W..... | (1) 1,000                | 0.0                       | (2) 115,000              | 0.2                       |
| Total E. of 66° W. Long.....   | 3,071,000                | 8.9                       | 7,939,000                | 11.8                      |
| Brown's bank.....              | 1,143,000                | 3.3                       | 4,731,000                | 7.1                       |
| Georges bank.....              | 11,391,000               | 32.9                      | 16,308,000               | 24.3                      |
| Cashes bank.....               | 855,000                  | 2.5                       | 25,000                   | 0.04                      |
| Middle bank.....               | 1,861,000                | 5.4                       | 850,000                  | 1.3                       |
| Jeffrey ledge.....             | 1,686,000                | 4.6                       | 1,392,000                | 2.1                       |
| South Channel.....             | 8,097,000                | 23.4                      | 28,105,000               | 41.9                      |
| Nantucket Shoal.....           | 427,000                  | 1.2                       | 1,846,000                | 2.8                       |
| Off Highland Light.....        | 1,197,000                | 3.4                       | 3,000                    | 0.0                       |
| Off Chatham.....               | 956,000                  | 2.8                       | 3,430,000                | 5.1                       |
| Other grounds W. of 66° W..... | (3) 3,893,000            | 11.3                      | (3) 2,420,000            | 3.6                       |
| Total W. of 66° W. Long.....   | 31,507,000               | 91.1                      | 59,110,000               | 88.2                      |
| Grand Total.....               | 34,578,000               | 100.0                     | 67,049,000               | 100.0                     |

(1) Canso bank only.

(2) Including, in order of importance, Grand, St. Peters, Misaine and St. Ann's banks, Cape North and the Gulf of St. Lawrence.

(3) Principally (90%) on inshore grounds.

THE QUESTION OF DEPLETION.—It has been shown above that since 1903 there has been a definite tendency for the haddock catch to increase both in the United States and Canada. Although the Canadian catch has been set back by economic conditions following the war, the total catch has continued to increase. This fact by itself does not eliminate the possibility of depletion. It might be

that increasing fishing effort has produced increasing catches with decreasing abundance of the haddock. Sufficient data are not available for the earlier years to test this. The annual catch per otter trawler is the nearest approximation available to the catch per fishing effort. Although small on the average since 1920 it was large again in 1927 and no lasting scarcity of haddock is indicated. In the preceding section it is shown that the grounds to the south of the gulf of Maine fished longest and most intensively still yield the greatest haddock catches. No general decrease of the catch on the nearer grounds and shift of the fishery further afield is in evidence.

Fluctuations in the abundance are to be expected due to the variability in the survival of successive year classes to attain commercial size, which has been found both in Europe and America. Local scarcity is probable, in both inshore and offshore grounds, but no general or lasting depletion is evident from the available statistics. It must be borne in mind, however, that sufficient data are not available to make this lack of evidence conclusive.

## THE GEOGRAPHICAL DISTRIBUTION OF THE NORTH AMERICAN HADDOCK CATCH

**METHOD OF PREPARATION OF THE CHART.**—In figure 2 an attempt has been made to represent quantitatively the distribution of the haddock catch in North American waters for the years 1917 to 1925. Each circular dot represents an average annual catch of 200,000 pounds in the locality represented by its position. Vertical crosses indicate small catches recorded in the various fisheries statistics. Diagonal crosses represent other records of the occurrence of a few haddock in commercial catches.

The average annual inshore and offshore catch landed in each county on the Canadian coast was calculated for the period 1917 to 1925. The detailed distribution of the Canadian offshore catches was estimated from information provided by the overseers in whose districts they were landed and by members of the industry.

The average annual catch landed at Boston, Gloucester and Portland from each fishing ground was calculated from the annual statistics published. It was assumed that the catches landed at New York were made on similar grounds to those of Boston. For the shore fisheries and vessel fisheries other than the above (amounting together to about fifteen per cent of the total United States catch) the chart is based on the average catch in each state for the years 1919 and 1924.

The distribution of the catch within the areas for which it is recorded—e.g. on different parts of the same banks—is not reliable. As the chart is on Mercator's projection the areas to the south are represented on a slightly smaller scale and the catch appears more concentrated than is the case to the north.

**THE GEOGRAPHICAL DISTRIBUTION OF THE NORTH AMERICAN HADDOCK CATCH.**—The more important features of the distribution may be seen in the chart (figure 2). The greatest catch is made in the neighbourhood of the South channel extending over Georges bank on the east and to cape Cod on the west. West of cape Cod only very small catches are made extending to cape May. In the gulf of Maine considerable catches are made inshore along the entire coast. Large catches are made on the south shore of the bay of Fundy near the mouth but they decrease markedly towards the head of the bay; on the north shore there is no commercial catch east of St. John.

Fair catches are made along the entire coast of Nova Scotia from cape Sable to cape North, C.B., with large catches in the vicinity of Canso and Ingonish, where haddock are taken in trap nets. Large catches are made on the banks off this coast particularly Brown's, Western and Quereau banks.





FIG. 2.—Distribution of the North American haddock catch 1918 to 1925. Dots represent average annual catches of 200,000 pounds, upright crosses small catches, and diagonal crosses records of the occurrence of haddock in catches of cod.

In the gulf of St. Lawrence, with the exception of a fair catch on the Cape Breton coast, only very small catches are made in spite of a great deal of line and trap net fishing for cod. These small catches extend throughout Magdalen bay. The very small catches elsewhere in the gulf are not mentioned in the statistics.

On the banks south and east of Newfoundland very small catches are made by United States vessels. The French catch on "Newfoundland bank" (including all French catches in North American waters) is very small—about 200,000 pounds annually. Records of Canadian, Newfoundland and Portuguese catches in this area are not available but they are probably small. They are estimated at not over 600,000 pounds, but their amount and distribution is very uncertain.

It must be remembered that the chart shows the catches and not the abundance of the haddock. The presence of a large haddock catch is indicative of the abundance of haddock but the relative abundance at various places cannot be judged safely from the catches. The absence of a haddock catch has significance only where a fishery exists using gear which will catch haddock.

### SUMMARY

1. The total haddock catches in North American waters since 1880 are summarized in table 4 and figure 1. The total catch has shown an increase from about 100,000,000 pounds in 1900 to about 214,000,000 pounds in 1927.

2. The post-war depression of the catch was relatively small in the United States. In Canada the decrease from 78,000,000 pounds in 1917 to 27,000,000 pounds in 1921 was due apparently to economic factors. It was most marked in the offshore fishery but also very general inshore.

3. The inshore and offshore catches are given for Canada in table 3 and the United States in table 1. The increasing total haddock catch is attributable largely to increasing vessel catches and the development of otter trawling.

4. The development of the New England otter trawl fishery is summarized in table 4. Starting in 1905, from 1920 to 1927 its catch averaged about one-half of the New England vessel catch and was made by about thirty-one steam trawlers. Since 1920 longer trips have been made with increased catches per trip. The catch per trawler has been low since 1920, but was high again in 1927.

5. The landings at Boston and Gloucester from various grounds during the periods 1891 to 1901 and 1916 to 1925 are summarized in table 6. The total haddock catch does not show a decrease on nearer grounds accompanied by increase further afield. The line fishery by itself does so, increases on the nearer grounds being due to the otter trawl fishery.

6. No general or lasting depletion is evidenced by the available statistics.

7. The geographical distribution of the North American haddock catch is shown in figure 2. The catch is made chiefly from Cabot strait to cape Cod being greatest in the South channel and the vicinity. Large catches are made on Georges, Browns, and the Sable island banks. With the exception of the head of the bay of Fundy considerable catches are made along the entire coast from cape Cod to cape North with large catches near Digby, Canso and Ingonish. Small catches are made in the southern part of the gulf of St. Lawrence.













